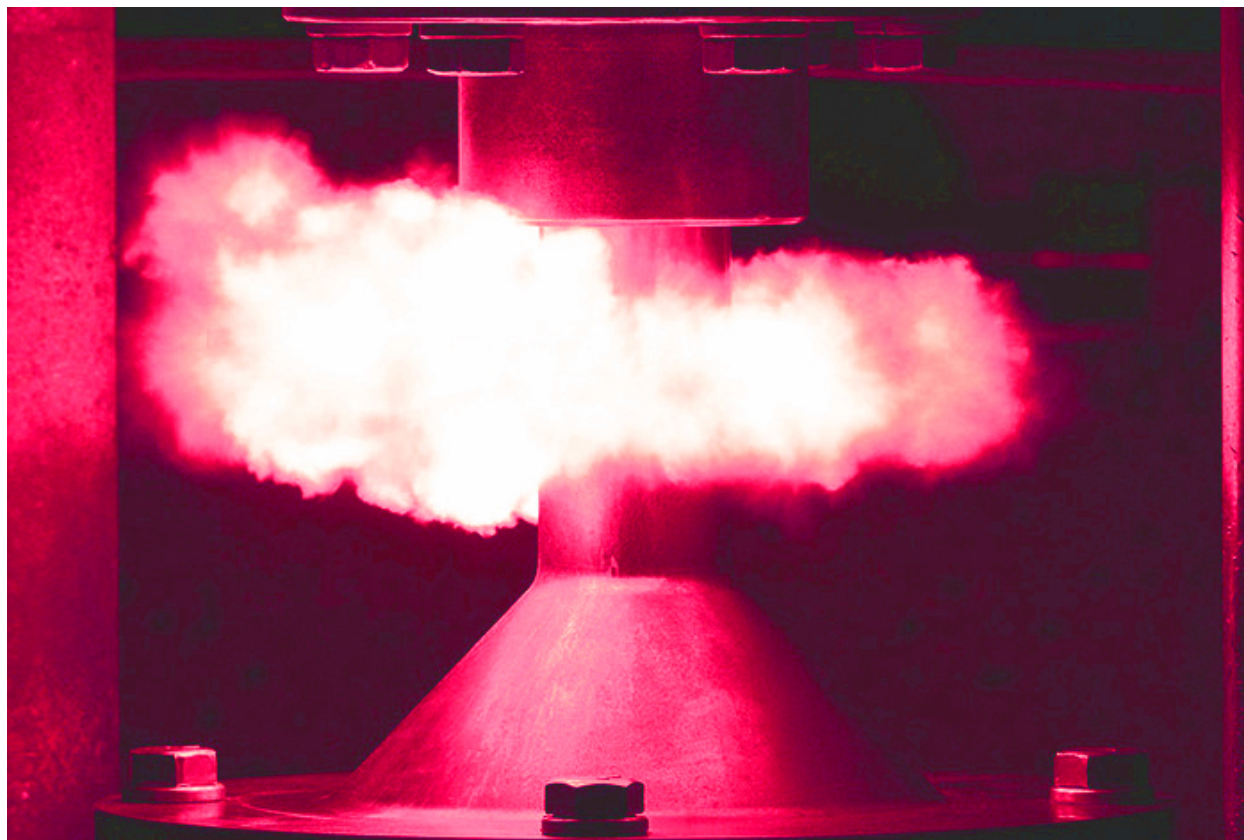


# What is a high explosive?

April 1, 2017



Explosives are materials that burn or decompose quickly, creating large quantities of gases, which take up much more space than the original materials. Chemical explosives are traditionally divided into two categories: low explosives and high explosives.

Low explosives are mixtures of chemicals that burn very rapidly, but [subsonically](#) (as opposed to supersonically), meaning that they “[deflagrate](#).” They consist typically of fuel and an [oxidizer](#). The black powder used in fireworks is one example of a low explosive. Black powder burns very quickly, but to get it to go bang, we have to contain it. Fireworks hold black powder inside a cardboard or paper tube so that once the powder has burned, the gases burst the container noisily. This is not unlike the action of popcorn, whose steam bursts its kernel.

High explosives consist of materials that typically combine the reacting elements in the same molecule. This allows them to react much faster, and they “detonate.” Detonation involves supersonic shock waves that pass through the material, causing chemistry that happens quite a bit faster than burning. High explosives do not need to be contained to make their bang. Nitroglycerine, trinitrotoluene, and RDX are high explosives. Los Alamos National Laboratory is engaged in important research into high explosives and

has been recognized for making them environmentally cleaner and more stable, which means safer.

Alfred Nobel's dynamite factories transported nitroglycerine, which is highly unstable, or "sensitive," in open wooden troughs to avoid the possibility of the pressure shocks that might occur in enclosed pipes of any sort. Many of the wrenches and other tools used in the factories were also fabricated from wood. Still the factories experienced several terrible explosions. During his career, Nobel suffered from terrible nitroglycerine headaches and late in his life, as his heart disease led to his death, he was treated with nitroglycerine. Nitroglycerine is rarely, if ever, still used by itself as an explosive (it is still used in propellant formulations and dynamite), but it is still used as a heart medication.

*Gordon McDonough, Science evangelist*

Occasionally questions are sent in to [edu-bsm@lanl.gov](mailto:edu-bsm@lanl.gov) or are left in our feedback box in the Museum.

We work to provide answers to these questions on [our blog](#) and the site where we list our [favorite questions and answers](#).



Operated by Los Alamos National Security, LLC for the Department of Energy's NNSA

